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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/671,774      | 09/29/2003  | Milan Hubacek        | Q77748              | 7565             |

23373 7590 10/20/2006  
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EXAMINER

TSOY, ELENA

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1762

DATE MAILED: 10/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/671,774

Applicant(s)

HUBACEK ET AL.

Examiner

Elena Tsoy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 5,9 and 16-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8 and 10-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

***Election/Restrictions***

Applicant's election without traverse of Group I, Claims 1-15, species of (A) urea, (B) an inorganic dielectric material, and (C) activated phosphor, in the reply filed on October 4, 2006 is acknowledged. Claims 1-33 are pending in the application. Claims 16-33 are withdrawn from consideration as directed to a non-elected invention; and Claims 5 and 9 are withdrawn from consideration as directed to a non-elected species.

***Claim Objections***

1. Claim 1 is objected to because of the following informalities: "which takes a solid form at 25 0C, is converted into a polar liquid by heating, and decomposes by further heating" should be changed to "which takes a solid form at 25 0C, is converted~~s~~ into a polar liquid by heating, and decomposes by further heating".
2. Claim 8 is objected to because of the following informalities: "comprises an inorganic dielectric material or an inorganic dielectric material" should be changed to "comprises an inorganic dielectric material ~~or an inorganic dielectric material~~".

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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The language of claim 9 renders the claim indefinite because it is not clear whether the coating is phosphor or a dielectric material. For examining purposes claim 9 was interpreted as follows: "The method of claim 1, wherein the inorganic particles comprise an dielectric material ~~and are coated with a phosphor or an activated phosphor~~ and the metal compound is a dielectric material".

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-4, 6-8, and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson (US 5,747,100) in view of Kim et al (US 6,274,110).

Peterson discloses methods for coating inorganic phosphor particles of 10 of 3-10 microns (See column 6, lines 49-51) with a coating 30 comprising electron-excitable UV-emitting having the chemical formula  $\text{ZnO} \cdot \text{Ga}_2\text{O}_3 \cdot \text{Gd}$  (claimed metal compound) wherein the zinc oxide and gallate form a matrix within which gadolinium exists as a **dopant** (See Fig. 2; column 6, lines 4-11). Various methods may be used for coating phosphor particles: e.g. sol-gel method (See column 6, lines 11-23) or preferably a method comprising first providing the proper proportions of the salts of the elements Zn, Ga, and Gd, the anions of which include, for example, nitrates, carbonates, citrates, alkoxides, or acetates, dissolving the salts in water to provide a first solution, having metal salt concentrations on the order of 10 grams per liter, then adding glycine and a 2:1 mixture of urea and carbonyldiurea ( $\text{CH}_6 \text{N}_4 \text{O}$ ) to the first solution to

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provide a final solution, and gently heating the final solution thereby reducing the water content and increasing the viscosity to provide a viscous solution, adding light-emitting particles 10 to the viscous solution to provide an admixed solution, thereafter, spray drying or processing in a fluidized bed the admixed solution to provide light-emitting particles 10 having coatings 30 thereon (See column 6, lines 22-50). The coated particles are then heated in an oven to a temperature in the range of 300-1000 degrees Celsius for an adequate period of time to achieve the crystallization and activation of coatings 30. The organic complexants of the applied viscous solution form a molecular glass with the metals. During the heating process, at 200 degrees Celsius, the salts and complexants are oxidized thereby leaving the pure metals in an amorphous homogeneous film. Further heating at the higher temperatures causes crystallization and activation of the film. The temperatures are maintained below the temperature limits of UV-excitabile light-emitting phosphor comprising particles 10. See column 6, lines 50-65. Obviously, organic material decomposes by heating thereby coating the inorganic phosphor particles with a metal compound which is converted from the metal salt, as required by Claim 1.

Peterson fails to teach that instead of preparing dispersion of the metal salts and inorganic particles in water, the dispersion is prepared in a *molten* urea which takes a solid form at 25<sup>0</sup>C, converts into a polar liquid by heating, and decomposes by heating (Claims 1-2).

Kim et al teach that it was well known in the art to prepare complex metal oxides using co-precipitation method (See column 1, lines 57-65) or sol-gel method (See column 2, lines 4-12). However, a *high quality* complex oxide of metals selected from the group consisting of Ag, Al, Ba, Ca, Cd, Co, Cr, Cu, Fe, Ga, K, Li, Mg, Na, Nb, Ni, Pb, Si, Sn, Sr, Th, Ti, U, Zn, Zr and rare earth metals (See column 3, lines 12-17) can be prepared by mixing *either* a solution of

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metal salt, e.g. nitrates (See column 4, lines 56-68) *or* the crystal thereof with urea or a carbohydrazide to produce a mixture and heating the mixture without ignition to produce a complex oxide precursor, and heating the complex oxide precursor to produce a crystallized complex oxide (See column 3, lines 1-4). Heating the mixture of the metal salt with urea or carbohydrazide and to a relatively low temperature (around 250<sup>0</sup>C) produces a product that can be used as raw materials for manufacturing electronic parts or the mixture can be heated to higher temperature to provide a complex oxide crystalline powder (See column 3, lines 36-43). The above mixture of metal salts with urea or a carbohydrazide melts to solution with dehydration, and if this solution is further heated, it changes to a clear solution by chemical interaction of the components in the melt (See column 3, lines 44-48). In other words, Kim et al teach that a solution of metal salt, e.g. nitrates is functionally equivalent to a crystal form thereof for preparing a desired mixture with urea or a carbohydrazide to produce complex metal oxides.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a mixture of salts in a crystal form with urea, glycine and a 2:1 mixture of urea and carbohydrazide in Kim et al instead of a mixture of an aqueous solutions of metal salts, glycine and a 2:1 mixture of urea and carbohydrazide with the expectation of providing the desired complex metal oxides since Kim et al teach that a solution of metal salt, e.g. nitrates is functionally equivalent to a crystal form thereof for preparing a desired mixture with urea or a carbohydrazide to produce complex metal oxides.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a mixture of metal salts with urea alone in Peterson with the expectation of providing the desired complex metal oxides since Kim et al teach that a *high quality* complex

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metal oxides can be prepared using a dispersion of metal salts, e.g. nitrates in the crystal thereof in a molten urea or a carbonylhydrazide, and Peterson does not limit his teaching to a particular method.

As to claim 6, Peterson further teaches that the light-emitting particles 10 can be obtained in a powder form from manufacturers (See column 5, lines 22-35), some of which are not conductive (See column 4, lines 41-65), i.e. Peterson does not limit his teaching to conductive particles.

7. Claims 1-4, 6-8, and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumada et al (US 20020093282) in view of Kim et al.

Kumada et al disclose that phosphor particles can be prepared by coating non-phosphor carrier particles such as alumina having a mean primary particle diameter of 1.5 microns (See P20), silica (claimed dielectric material) (See P12) with phosphor (See P8), e.g. having an **activator** (See P13-14). The method for manufacturing the phosphor particle may be any method as long as among elements constituting a phosphor, a compound containing a metal element and an inorganic non-phosphor material are mixed and baked. For instance, the method may be such that water in which particles of a solid inorganic non-phosphor material are dispersed and an aqueous solution of metal salts such as nitrates (See P20) are mixed, and a precursor of the phosphor is deposited around the inorganic material by co-precipitation (See 20), then, dried and baked (See 16).

Kumada et al fail to teach that instead of preparing dispersion of the metal salts and inorganic particles in water, the dispersion is prepared in a *molten* urea which takes a solid form at 25<sup>0</sup>C, converts into a polar liquid by heating, and decomposes by heating (Claims 1-2).

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Kim et al are applied here for the same reasons as above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a dispersion of metal salts and core particles in a *molten* urea in Kumada et al instead of dispersion of core particles in an aqueous solution of metal salts with the expectation of providing the desired complex metal oxides since Kim et al teach that a *high quality* complex metal oxides can be prepared using a dispersion of metal salts, e.g. nitrates in the crystal thereof in a molten urea or a carbonylhydrazide, and Kumada et al do not limit his teaching to a particular method.

8. Claims 1-4, 6-8, and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumada et al in view of Wataya et al (US 5879647), further in view of Kim et al.

Kumada et al are applied here for the same reasons as above. Kumada et al show an example of preparing complex metal oxides by co-precipitation which includes dispersing alumina in an aqueous solution of metal nitrates in a predetermined molar ratio adding a solution of **ammonium carbonate** in ammonia water, stirring for 60 minutes, thereby obtaining precipitates. See P20.

Kumada et al fail to teach that urea can be used instead of solution of **ammonium carbonate** in ammonia water.

Wataya et al teach that when an aqueous solution of a water-soluble inorganic salt of yttrium such as sulfate or nitrate (See column 4, lines 3-4) is admixed with urea and the thus prepared reaction mixture is heated so that the urea in the solution is hydrolyzed into ammonium and carbonate ions which cause *precipitation* of fine particles of yttrium carbonate hydroxide having a submicron particle diameter followed by recovery of the precipitates and calcination



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thereof in an oxidizing atmosphere to convert the same into particles of yttrium oxide (See column 1, lines 61-67 to column 2, lines 1-5) at 800<sup>0</sup>-1000<sup>0</sup>C (See column 5, lines 44-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used **urea** as precipitant in Kumada et al instead of solution of ammonium carbonate in ammonia water with the expectation of providing the desired *precipitation* upon heating, as taught by Wataya et al.

Kumada et al in view of Wataya et al fail to teach that instead of preparing dispersion of inorganic particles in a solution of metal salts and urea in water, the dispersion is prepared in a *molten* urea which takes a solid form at 25<sup>0</sup>C, converts into a polar liquid by heating, and decomposes by heating (Claims 1-2).

Kim et al are applied here for the same reasons as above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a dispersion of metal salts and core particles in a *molten* urea in Kumada et al in view of Wataya et al instead of dispersion of core particles in an aqueous solution of metal salts and urea with the expectation of providing the desired complex metal oxides since Kim et al teach that a solution of metal salt, e.g. nitrates is functionally equivalent to a crystal form thereof for preparing a desired mixture with urea or a carbohydrazide to produce complex metal oxides.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a dispersion of metal salts and core particles in a *molten* urea in Kumada et al in view of Wataya et al instead of dispersion of core particles in an aqueous solution of metal salts and urea with the expectation of providing the desired complex metal oxides since

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Kim et al teach that a *high quality* complex metal oxides can be prepared using a dispersion of metal salts, e.g. nitrates in the crystal thereof in a molten urea or a carbonyhydrazide, and Kumada et al do not limit his teaching to a particular method.

9. Claims 1-4, 6, 10, and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al (US 5,522,923) in view of Kim et al.

Kimura et al disclose a method for coating inorganic pigment particles of 1-50 microns (See column 3, lines 7-8) comprising preparing a dispersion which comprises a metal salt such as iron nitrate or iron sulfate (See column 4, lines 3-4), urea and inorganic pigment particles; heating at 80<sup>0</sup>C-100<sup>0</sup>C for neutralization; coating the pigment particles with iron oxide hydrate, and heating at 150<sup>0</sup>C -800<sup>0</sup>C whereby coating the inorganic particles with iron oxide which is converted from the metal salt (claimed metal compound) (See column 4, lines 5-7).

Kimura et al fail to teach that instead of preparing dispersion of the metal salt and inorganic particles in water, the dispersion is prepared in a *molten* urea which takes a solid form at 25<sup>0</sup>C, converts into a polar liquid by heating, and decomposes by heating (Claims 1-2).

Kim et al are applied here for the same reasons as above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a dispersion of a metal salt and core particles in a *molten* urea in Kimura et al instead of dispersion of core particles in an aqueous solution of the metal salt with the expectation of providing the desired metal oxide since Kim et al teach that a solution of metal salt, e.g. nitrates is functionally equivalent to a crystal form thereof for preparing a desired mixture with urea or a carbonyhydrazide to produce complex metal oxides.

***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Thursday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy  
Primary Examiner  
Art Unit 1762

ELENA TSOY  
PRIMARY EXAMINER



October 17, 2006